

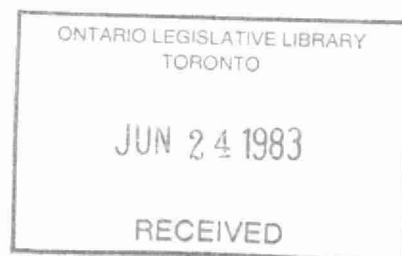
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MINISTRY OF THE ENVIRONMENT

ASSESSMENT OF CHLORIDE CONTAMINATION
OF GROUND AND SURFACE WATER FROM SAND/SALT STOCKPILE,
TOWN OF WHITCHURCH-STOUFFVILLE,
CONCESSION 4, LOT 17.

R. G. HODGINS

1974



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MINISTRY OF THE ENVIRONMENT

REPORT ON FIELD INVESTIGATIONS

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1974
A71

DATE OF EXAMINATION - July 1974

PLACE - Town of Whitchurch-Stouffville
Community of Vaudorf

MATTER INVESTIGATED - Assessment of Chloride Contamination

AT REQUEST OF - A. E. Starr, Councillor, Town of Whitchurch-Stouffville

INSPECTION MADE IN COMPANY WITH - J. E. Sheldon

REPORTS TO BE SENT TO -

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R. Gibson - Engineer, Whitchurch-Stouffville

A. E. Starr - Councillor, Whitchurch-Stouffville

F. Symons

REPORT BY

R. Hodgins

NOTE: This completed form to be attached to each report.

Introduction:

Mr. A. E. Starr, Councillor for the Town of Whitchurch-Stouffville, requested through Mr. George Trewin, Manager, Municipal & Private Abatement, Central Region, that the Ministry of the Environment provide assistance in evaluating what affect the existing sand/salt storage pile, located in the Community of Vandorf, may have on the natural ground-water quality and on the water quality of the East Branch of the Holland River passing just north of the property.

Field Investigations:

The sand/salt pile under study is located on the property of the Town of Whitchurch-Stouffville, in lot 17, concession 4, Town of Whitchurch-Stouffville, in the community of Vandorf. The East Branch of the Holland River passes within a 100 feet of the north property line.

On July 30, 1974, a preliminary investigation was undertaken to locate and sample all private wells in the immediate vicinity of the sand/salt pile, particularly, those for which water well records are available. On the following day additional water samples were obtained from three of eight augered test wells, constructed in the vicinity of the storage pile. Drawing No.1 shows the location of the test wells and private wells in the study area. Drawing No.2, shows the surface spot elevations determined from a levelling survey conducted during the latter visit. Table 1 contains the static-level measurements reported on the available water well records in addition to those measurements obtained during the field visits. These measurements and the depth of each well were related to an assumed bench mark on the property.

Site Observations:

The pile, consisting of a sand/salt mixture is deposited directly on the ground surface at the rear of the property. The existing quantity was estimated at roughly half the normal 3500 tons stockpiled at the site each fall.

The ground surface in the area under study slopes gently to the northwest and a similar ground-water flow gradient is demonstrated by the various water level measurements. A shallow surface drain exists along the north boundary of the property. Although the east end of the drainage ditch supported a healthy grass growth, the west end was void of all vegetation and contained heavy deposits of the sand/salt mixture apparently washed from the pile during periods of rain. This surface drain was connected to the drainage channel on the east side of Don Mills Road which in turn flows approximately 75 feet north to the stream.

Further evidence of apparent salt contamination was observed along the front portion of Mr. Pattenden's lawn. The grass, which had already been replaced on one occasion, was again dying.

Hydrogeology:

The surficial overburden in the area under consideration consists of water-bearing sand seams intermingled with clay in the initial 10 feet below surface. Water was encountered in only six of the eight test wells. Test Wells 7 & 8 were dry holes. The direction of ground-water flow established from the remaining six holes, and two shallow dug wells is towards the northwest as shown in Drawing No. 3.

Blue clay underlies this surficial aquifer to a depth of approximately 90 feet. A second aquifer, consisting mainly of gravel and sand, was reportedly encountered beneath this clay formation, by both the Pattenden and the Township Municipal Office wells. The direction of flow in this lower aquifer is apparently also in a northerly direction.

Water Quality:

The results of the water analyses are shown in Table 2. The natural quality of the ground-water in both upper and lower aquifers are probably represented by the Dewsbury and the Township Municipal Office wells, respectively.

The chloride concentrations of samples taken from domestic wells obtaining their supplies from the shallow water-bearing formation, although within the permissible criteria set out for drinking water standards, are considerably higher than those reported for the samples taken from the drilled wells constructed into the lower aquifer. The stream sample taken during a dry weather period contained chloride concentrations well within the desirable range for drinking water. Water samples taken from test wells 1, 3, and 5, on the other hand, were found to contain chloride levels far in excess of these acceptable criteria. The chloride concentrations did, however, decrease roughly proportionately with the distance from the storage pile.

Conclusions:

Chloride rich leachate, origininating from the sand/salt storage pile on the Town of Whitchurch-Stouffville property has apparently infiltrated the surficial water-bearing material or aquifer and has resulted in the contamination of ground-water downgradient of the storage pile. Since ground-water movement in the area is towards the northwest, the contamination of the groundwater is probably confined horizontally by the drainage channel on the east side of Don Mills Road and vertically by the presence of the clay deposit underlying the surficial aquifer. The intercepted run-off is then drained north to the stream. Drawing No. 4 shows the approximate extent of the contaminated area.

Further contamination of the stream, likely occurs with each rain, since the surface runoff from the vicinity of the storage pile is drained directly to the stream.

Only the Pattenden well is downgradient from the storage pile, however, it's water supply is obtained solely from the deeper aquifer which is reported to be virtually free of chlorides. Similarly the well supplying the Bank, the Community Hall and the Township garage also remains free of contamination from the nearby storage pile.

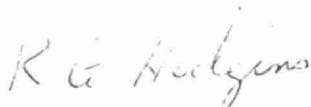
The Pain and Dewsbury wells both obtain their water supply from the shallow aquifer but do not appear to be downgradient of the storage pile. The chloride concentration reported for the Pain well although still within the permissible criteria of drinking water standards, is more than four times the chloride concentration encountered in the Dewsbury well. The wide difference may possibly be attributed to seasonal salting of Don Mills Road as only the Pain well is downgradient of this source.

If a dome was built to cover the pile or if the pile was removed, natural flushing action would remove the excess chloride contained in the soil and ground-water would eventually return to its natural quality.

Recommendation:

The sand/salt pile should be covered with a dome. The Ministry of Transportation & Communications has information available on the construction of such domes.

Report By:



R. G. Hodgins
Ground Water Technologist

Approved By:



W. Lammers
Chief, Water Resources Assessment
Technical Support Section
Central Region

TABLE 1

<u>Location</u>	<u>Ground Elevation</u>	<u>Depth</u>	<u>Bottom Elevation</u>	<u>Static Level</u>	<u>Elevation</u>
TW # 1	100.9	6.2	94.7	3.3	97.6
TW # 2	100.4	3.5	96.9	3.2	97.2
TW # 3	97.4	6.0	91.4	4.9	92.5
TW # 4	96.3	2.7	93.6	2.3	94.0
TW # 5	94.2	4.0	90.2	2.7	91.5
TW # 6	98.9	4.0	94.9	3.6	95.3
TW # 7	107.0	5.0	102.0	Encountered stiff clay deposit - No water found	
TW # 8	111.5	3.0	108.5	Encountered stiff clay deposit - No water found	
Township Well	108.7	98	10.7	15.2	93.5
Pattenden Well	97.4	90	7.4	20 (July/62)	77.4
Dewsbury Well	105	11	94	8.8	96.2
Pain Store Well	99	12	87	Inaccessible	
Garage Well	100	12	88	8.8	91.2
Stream	89.4	1.1	88.3		

100.0 Assumed elevation of base of Royal Bank of Canada sign.

Prepared by: ISFI

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CON. III

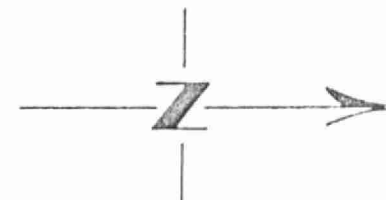
LOT 16

LOT 17

■ s
Pain
General
Store

Garage

Rink



DON MILLS ROAD

CON. IV

D. Dewsbury

School

Bank

Community
HallTWP.
Garage

Winter Perimeter

Summer Perm.

Sand/Salt
Pile

OTW-7

OTW-5

OTW-6

TW-40

TW-30s

Pattenden

Alcorn

HOLLAND RIVER

LEGEND

- Dug Well
- Drilled Well
- ⊙ Municipal Well
- Test Well
- S Sampled Location
- Concession Boundary
- Lot Line

MINISTRY OF THE ENVIRONMENT

Central Region

Technical Support

TOWN OF WHITCHURCH - STOUFFVILLE

COMMUNITY OF VANDORF

SALT CONTAMINATION OF PRIVATE
WELL SUPPLIES

LOCATION

Date: SEPT. '74'

Prepared by: DS

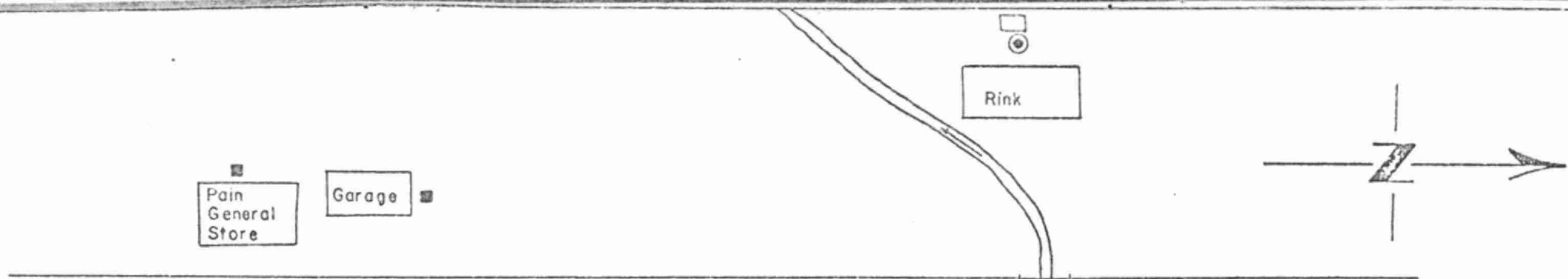
Scale:

1 IN. = 100 FT.

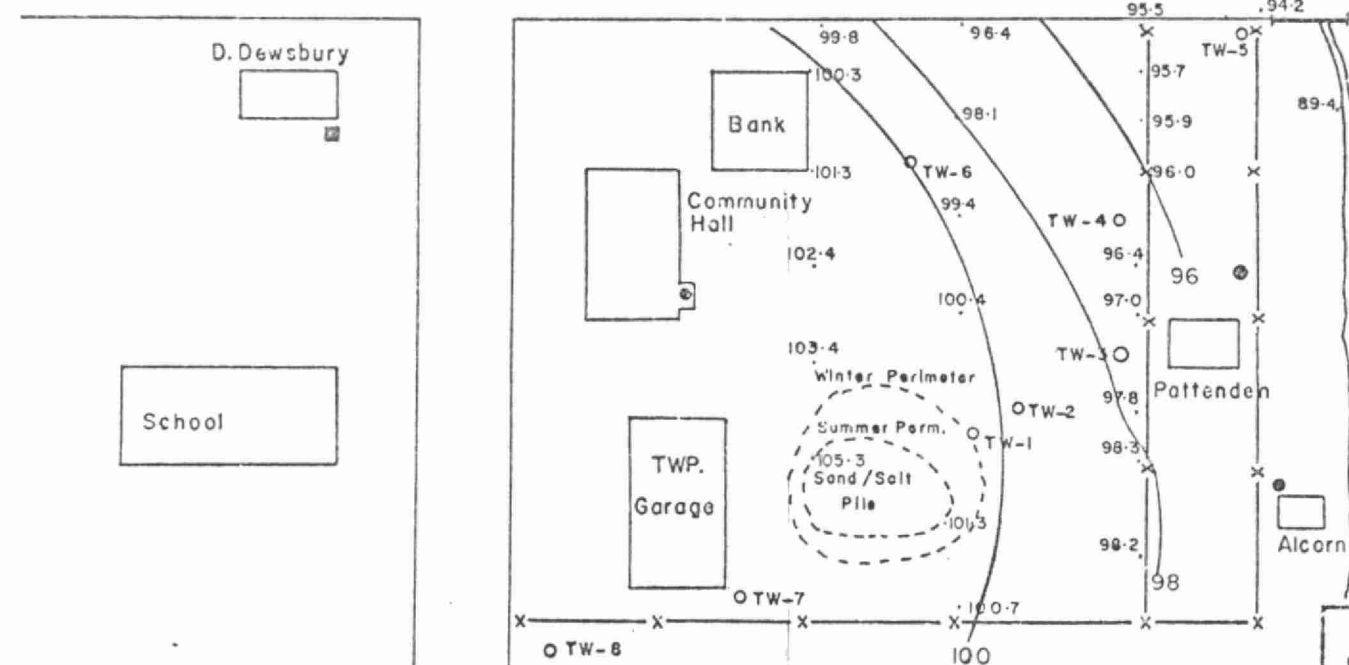
1 cm. = 12 m.

Drawing No:

FIG. 1

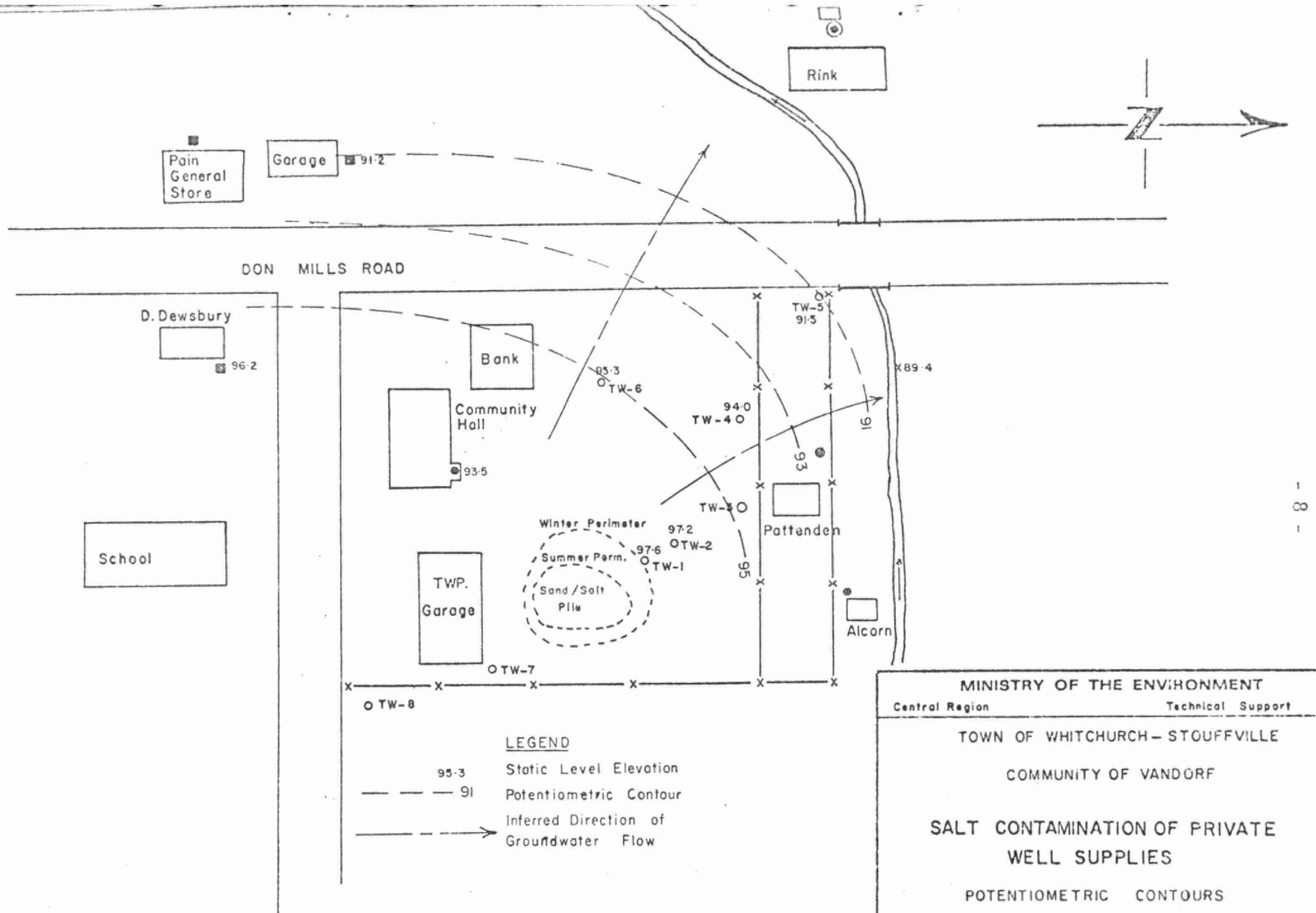


DON MILLS ROAD



NOTE:
Assumed elevation 100 FEET at base of bank sign

MINISTRY OF THE ENVIRONMENT		
Central Region	Technical Support	
TOWN OF WHITCHURCH-STOUFFVILLE.		
COMMUNITY OF VANDORF		
SALT CONTAMINATION OF PRIVATE WELL SUPPLIES		
SURFACE CONTOURS		
Date: SEPT. '74'	Scale: 1 IN. = 100 FT. 1 cm. = 12 m. (approx.)	Drawing No. FIG. 2
Prepared by: DS		



Date: SEPT. '74'

Prepared by: GS

Scale:
1 in. = 100 ft.
1 cm. = 12 m.
(approx.)

Drawing No:
FIG. 3

CON. III

CON. IV

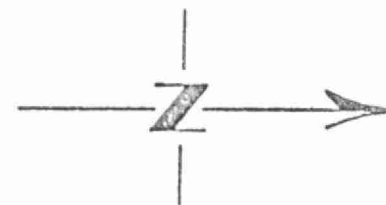
LOT 16

LOT 17

8
Pain
General
Store

Garage

Rink



DON MILLS ROAD

D. Dewsbury

School

Bank

Community
Hall

TWP.
Garage

Winter Perimeter

Summer Perim.

Sand/Salt
Pits

TW-40

TW-30S

OTW-2

OTW-13

OTW-7

OTW-8

TW-5S

HOLLAND RIVER

Pattenden

Alcorn

LEGEND

- Dug Well
- Drilled Well
- ⊙ Municipal Well
- Test Well
- S Sampled Location
- Concession Boundary
- Lot Line
- Zone of Contamination

MINISTRY OF THE ENVIRONMENT

Central Region

Technical Support

TOWN OF WHITCHURCH - STOUFFVILLE

COMMUNITY OF VANDORF

SALT CONTAMINATION OF PRIVATE
WELL SUPPLIES

Date: SEPT. '74'

Prepared by: D.C.

Scale:
1 in. = 100 ft.
1 cm. = 12 m.

Drawing No:
FIG. 4



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